WHITE DESERT
ANTARCTICA

Carbon Footprint Report

Direct and Indirect Greenhouse Gas Emissions of the company White Desert Ltd, Reference period 2021 – 2022

TERRAnova

Athens

May 2023

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1. General Information

1.1 General information and aim of the project

The aim of this project is the development of an annual carbon footprint report for the facilities and offices of **White Desert Ltd** located in South Africa and Antarctica for the reference period: 25 October 2021 – 24 October 2022. The intended use of this report is informative.

This report covers the carbon footprint for direct emissions – Category 1 (Scope 1) and main indirect emissions (Category 2 (Scope 2), Category 3 & 4 (Scope 3)), based on the definitions given in ISO 14064-1:2018 and GHG protocol. The report covers greenhouse gas emissions over which the company has direct operational control. The GHG emissions examined in this report are: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). It does not cover other GHG for which either reliable data do not exist or there is much uncertainty or unreasonable difficulty in the determination of activity data. Also, it should be mentioned that this report covers at least 95% of Scope 1 and Scope 2 company's emissions.

The White Desert Ltd aims to monitor, report, reduce and offset the carbon footprint of its facilities in order to carry out carbon off setting. To achieve this goal, direct and indirect carbon emissions from emission sources within the boundaries of the facilities are calculated.

The methodology followed for the quantification of GHG emissions as well as reporting was based on:

- ISO 14064-1:2018 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
- The Greenhouse Gas Protocol: A corporate reporting and accounting standard (revised edition), WRI & WBCSD (March 2004).
- The Carbon Neutral Protocol, the global standard for carbon neutral programmes, Natural Capital Partners (January 2022).

The methodology followed as well as the quantification data are presented in the following chapters.

Project team

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1.2 Description of the reporting Organization

White Desert Ltd has been operating a commercial tourism and logistics operation in Dronning Maud Land since 2006. The operation primarily offers small-scale, bespoke experiences for clients with numbers limited to approximately 24 clients in Antarctica at any one time. Visits are of a short duration and take place between November and February each year, over the Antarctic summer. Clients are based in Whichaway Camp in the Schirmacher Oasis and can undertake activities around this area, excursions to Atka Bay and/or the South Pole. In addition to tourism activities, White Desert also provides logistical support for the scientific community and national programs in the region.

White Desert owns a number of vehicles (snow mobiles, of off-road vehicles and snow groomers/tractors vehicles for transportation and maintenance), plant (such as generators and heater) and uses sub-leased aircrafts for internal flights to Atka Bay, FD83 and South Pole and intracontinental flights for clients and staff transportation.

Picture 1.2.1 Wolf's Fang Runway.

The following tables are presenting information for each facility of White Desert Ltd.

Table 1.2.1 Office in Cape Town, South Africa

Area where the facility is situated:	
Reporting period:	25 October 2021 – 24 October 2022
Organization information	
Name of the facility:	White Desert Ltd (offices)
Address:	Courtyard 53, Whitby Rd, Wynberg, Cape Town, 7800, South Africa
Client representative:	Eleni Antoniades, Chartered Environmentalist, Environmental Scientist
Email:	eleni@white-desert.com
Telephone:	+44 7989551973
Operation Data	
Area of the facility:	100 m^2
Work days during the reporting period:	253
Number of employees:	15 full time

Table 1.2.2 Facilities in Antarctica

Area where the facility is situated:	
Reporting year:	25 October 2021 – 24 October 2022
Organization information	
Name of the facility:	White Desert Ltd (Wolf's Fang Runway, Whichaway Camp, Echo camp, Atka bay, Fuel Depot)
Address:	Queen Maud Land, Antarctica

Client representative:	Eleni Antoniades, Chartered Environmentalist, Environmental Scientist
Email:	eleni@white-desert.com
Telephone:	+44 7989551973
Operation Data	
Area of the facility:	-
Working season during the reporting period:	25/10/2021 – 28/02/2022
Number of employees:	115
Number of clients during the season:	248

2. Organizational boundaries

2.1. Facilities

This report covers White Desert Ltd facilities in South Africa and Antarctica and all the activities that take place. These facilities are:

- Head Office in Cape Town, South Africa. The office is used for the accounting and operational services of the company.

- Antarctica sites include:

  - Client and staff accommodation camps located at:
    - Wolf's Fang Runway (the main gateway to Antarctica for all White Desert operations) and Transit Camp (Wolf's Fang Camp) where clients are staying for a short period of time,
    - Whichaway Camp, which provides the main client accommodation camp for White Desert.

  - Field Camps located at:
    - Atka Bay Field Camp, where there is a skiway and a field camp,
    - FD 83 Field Camp, this location comprises a skiway, a small temporary field camp as well as fuel stored in IBC and drums,
    - Fuel Depot, which is the main site where fuel is stored in bulk containers. Also, there is a small field camp for White Desert logistical staff and skiway at this location.

White Desert Ltd calculates the greenhouse gas emissions from all the activities that take place in its facilities such as electricity used, and consumption of fuels that has financial or operational control. In addition, greenhouse gas emissions from the transportation of guests, from Cape Town to Antarctica, business travels by employees and waste production are included.

2.2. Reporting boundaries

The GHG emission sources that are defined for carbon accounting in this report include direct and indirect emissions:

- **Direct emissions:** GHG emissions from sources that are owned or controlled by the organization.
- **Indirect emissions:** GHG emissions resulting from the activities of the organization, but occurring from sources that are not owned or controlled by the organization.

2.2.1 Boundaries and emission sources

The sources of greenhouse gas emissions are presented in tables 2.1 and 2.2 below.

Table 2.1: Emission sources for the carbon footprint report of office in Cape Town.

Source	Require-ment	General description	Emission sources	Source streams	GHG emissions
Category 1. Direct emission sources – Company owned sources (non – biogenic)					
1.1 Stationary combustion	Required	There are no stationary combustion sources in the office			CO_2, CH_4, N_2O
1.2 Mobile combustion	Required	No company vehicles used			CO_2, CH_4, N_2O
1.4 Fugitive HFCs emissions	Required	There are no air conditioning assets in the office			HFCs
Category 2. Indirect emission sources – Imported electricity generation (non – biogenic)					
2.1 Electricity generation	Required	Emissions from the generation of imported electricity purchased by the organization	Consumption of electricity from electricity grid	Purchased electricity	CO_2, CH_4, N_2O
Category 3. Indirect emission sources – Transportation (non – biogenic)					
3.5 Business travel	Required	Emission from business travel of employees (short-haul and long-haul distances)	Airplane	Fuel	CO_2, CH_4, N_2O
	Recommended	Emissions arising from hotel accommodation associated with business travel	Consumption of energy and materials	Electricity, fuels etc	CO_2 eq
Category 4: Indirect emission sources – Products used by organization (non – biogenic)					

Source	Require-ment	General description	Emission sources	Source streams	GHG emissions
4.3 Disposal of solid waste	Required	Production of recycling and household waste from office activities	Waste	Process of waste disposal and recycling	CO_2 eq

Table 2.2: Emission sources for the carbon footprint report of Antarctica facilities

Source	Require-ment	General description	Emission sources	Source streams	GHG emissions
Category 1. Direct emission sources – Company owned sources (non – biogenic)					
1.1 Stationary combustion	Required	Heating and electricity supply	Generators, heaters	Jet A1	CO_2, CH_4, N_2O
		Cooking for staff and visitors	Cooking equipment	Propane	CO_2, CH_4, N_2O
1.2 Mobile combustion	Required	Company owned ground vehicles	Snow groomers/tractors, skidoos, and off-road vehicles	Jet A1, petrol	CO_2, CH_4, N_2O
		Sub-leased ground vehicles	4x4 Arctic Truck	Jet A1	CO_2, CH_4, N_2O
		Sub-leased aircrafts	Gulf Stream G550, Basler BT 67	Jet A1	CO_2, CH_4, N_2O
1.3 Fugitive HFCs emissions	Required	There are no air conditioning assets in Antarctica facilities			HFCs
Category 2. Indirect emission sources – Imported electricity generation (non – biogenic)					
2.1 Electricity generation	Required	There is no mains electricity in Antarctica			CO_2, CH_4, N_2O
Category 4: Indirect emission sources – Products used by organization (non – biogenic)					
4.3 Disposal of solid waste	Required	Production of recycling and household waste	Waste	Process of waste disposal and recycling	CO_2 eq

3. Methodology

The methodology followed for the quantification and reporting of GHG emissions is consistent with the following international standards:

- ISO 14064-1:2018 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals,
- The Greenhouse Gas Protocol: A corporate reporting and accounting standard (revised edition), WRI & WBCSD (March 2004),
- The Carbon Neutral Protocol, the global standard for carbon neutral programmes, Natural Capital Partners (January 2022).

The above standards define emissions as direct or indirect, which are further categorized as:

- Category 1 (Scope 1): All direct GHG emissions
- Category 2 (Scope 2): Indirect GHG emissions from consumption of purchased electricity, heat or steam
- Categories 3, 4, 5 & 6 (Scope 3): Other indirect GHG emissions from company-related activities from sources not owned or controlled by the company.

This report covers the GHG emissions for all direct (Category 1) and the following indirect GHG emissions:

- ✓ From the consumption of electricity in Cape Town's office (Category 2),
- ✓ From business travel of employees and hotel accommodation (Category 3),
- ✓ From solid waste disposal of household and recycling waste, produced in office and Antarctica activities (Category 4).

The steps followed for the completion of the quantification procedure include:

- identification of GHG sources and organization boundaries;
- selection and collection of GHG activity data;
- calculation of GHG emissions using appropriate equations and emission factors;
- documentation and development of archives of GHG inventory records, including information management activities;
- development of appropriate procedures in order to ensure accuracy, repeatability, transparency and completeness of the GHG inventory. These procedures include internal audit, definition of roles and responsibilities, management review.

In particular, the quantification is performed by calculation based on GHG activity data multiplied by GHG emission factors. The activity data derived from invoices or other reliable information sources, while emission factors derived from a recognized origin (WRI, UNFCC, etc.). Global Warming Potential values derive from IPCC's Fifth Assessment Report (AR5). The equations used for each source stream are analyzed below.

3.1 Direct emissions – Category 1 (Scope 1)

Direct emissions come from sources that are owned or controlled by the company. The methodology followed for the calculation of GHG emissions for each source stream is described below.

- **Stationary and mobile combustion (non-biogenic)**

The calculation of GHG emissions from the stationary combustion of fuel Jet A1 in generators, heaters, and propane in cooking equipment, as well as the mobile combustion of fuels Jet A1 and petrol in snow groomers, vehicles, and skidoos, is based on the following equation:

$$\textit{Equivalent } CO_2 \textit{ emissions [t]} = \textit{Consumed fuel [liters]} \times \textit{Emission factor } [tCO_2 \text{ or } tCH_4 \text{ or } tN_2O \text{ / liter}] \times \textit{GWP } [tCO_2e \text{ / } tCO_2 \text{ or } tCH_4 \text{ or } tN_2O]$$

The fuel consumption derives from actual activity data of the company, based on fuel purchased during the reporting period.

3.2 Indirect emissions

Indirect emissions are a consequence of the activities of the company but occur from sources owned or controlled by another entity. The methodology followed for the calculation of indirect GHG emissions is described below.

- **Indirect emissions from imported energy (non-biogenic) – Category 2 (Scope 2)**

The calculation of GHG emissions from electricity consumption from the South African electricity grid is based on the following equation:

Equivalent CO_2 emissions	=	*Consumed electricity*	X	*Office's surface*	X	*Number of work days*	X	*Emission factor*	X	*GWP*
[t]		*[kWh/m²]*		*[m²]*		*[days]*		*[tCO_2 or tCH_4 or tN_2O /kWh]*		*[tCO_2e / tCO_2 or tCH_4 or tN_2O]*

Electricity consumption is calculated by multiplying the amount of electricity consumed per m^2 of Cape Town's office based on literature data (Energy Research Centre in South Africa) by the working days during the reporting period. Specific activity data of consumed electricity (kWh) in the office are not available due to the fact that electricity purchase is included in the rental price.

- **Indirect emissions from transportation – Category 3 (Scope 3)**

The calculation of GHG emissions from business air travels and hotel accommodation of employees of South Africa's office, are based on the following equations:

- Business air travels

Equivalent CO_2 emissions	=	*Distance traveled*	X	*Number of passengers*	X	*Emission factor*	X	*GWP*
[t]		*[km]*		*[passengers]*		*[tCO_2 or tCH_4 or tN_2O / passenger-km]*		*[t CO_2e / tCO_2 or tCH_4 or tN_2O]*

The distance and number of passengers for business air travels derive from the number of flights made and the distance (kilometers) per trip covered by employees during the reporting period. All flights confirmed as economy class.

- Hotel accommodation

Equivalent CO_2 emissions [t]	=	*Rooms per night*	X	*Emission factor [tCO_2e/ room per night]*

The number of hotel nights derive from company's activity data. There were no available data for breakdown the rooms per night by country.

- **Indirect emissions from products used by organization – Category 4 (Scope 3)**

The calculation of GHG emissions from the disposal of solid household and recycling waste produced from activities in the office of South Africa as well as from activities in Antarctica, is based on the following equation:

Equivalent CO2 emissions [t]	=	*Waste production [t/month/employee]*	*X*	*Number of employees [employees]*	*X*	*Number of months [months]*	*X*	*Emission factor [tCO_2e/ t]*

Activity data from office waste were assumed based on an annual estimate of 50kg (4.2 kg/month) recycled and 50kg (4.2 kg/month) landfilled waste per employee in Cape Town's office. These data were then multiplied by the number of employees and months of the reporting period.

3.3 Emission factors

The emission factors required for the calculation of the equivalent CO_2 emissions are presented in the following table.

Table 3.1 Emission factors of CO_2, CH_4, N_2O and CO_2 eq used in the calculations for the reporting period 2021/2022

SOURCE STREAM CO_2	EMISSION FACTOR	UNIT	DATA SOURCE
JET A1 (Aviation turbine fuel)	0.003	tCO_2/l	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PROPANE (LPG)	2.935	tCO_2/t	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PETROL (Average biofuel blend)	0.002	tCO_2/l	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
ELECTRICITY	0.0009	tCO_2/kWh	Climate transparency report 2022, South Africa (EF for 2021)
AIR TRAVEL (Short-haul, to/from UK)	0.0002	tCO_2/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
AIR TRAVEL (Long-haul, to/from UK)	0.0001	tCO_2/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
GWP	1	tCO_2/ tCO_2 eq	IPPC 5th Assessment Report (AR5)
SOURCE STREAM CH_4	**EMISSION FACTOR**	**UNIT**	**DATA SOURCE**
JET A1 (Aviation turbine fuel)	0.00000006	tCH_4/l	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PROPANE (LPG)	0.00009	tCH_4/t	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PETROL (Average biofuel blend)	0.0000003	tCH_4/l	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
ELECTRICITY	0.00000003	tCH_4/kWh	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - UK electricity
AIR TRAVEL (Short-haul, to/from UK)	0.0000000004	tCH_4/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
AIR TRAVEL (Long-haul, to/from UK)	0.0000000004	tCH_4/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
GWP	28	tCH_4/tCO_2 eq	IPPC 5th Assessment Report (AR5)
SOURCE STREAM N_2O	**EMISSION FACTOR**	**UNIT**	**DATA SOURCE**
JET A1 (Aviation turbine fuel)	0.00000008	$t\ N_2O/l$	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PROPANE (LPG)	0.000006	tN_2O/t	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
PETROL (Average biofuel blend)	0.00000002	$t\ N_2O/l$	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Fuels
ELECTRICITY	0.000000005	$t\ N_2O/kWh$	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - UK electricity

AIR TRAVEL (Short-haul, to/from UK)	0.000000003	N_2O/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
AIR TRAVEL (Long-haul, to/from UK)	0.000000002	N_2O/ passenger-km	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Business travel - air (Economy class - With RF)
GWP	265	t N_2O/tCO_2 eq	IPPC 5th Assessment Report (AR5)
SOURCE STREAM CO_2 eq	**EMISSION FACTOR**	**UNIT**	DATA SOURCE
HOUSEHOLD RESIDUAL WASTE - LANDFILL	0.47	tCO_2 eq/t	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Waste disposal
RECYCLED WASTE (PAPER, PLASTIC, METAL, GLASS)	0.02	tCO_2 eq/t	UK DEFRA Conversion factors 2021_Full_set_advanced_ users - Waste disposal
HOTEL ACCOMMODATION (Average factor)	0.04	tCO_2 eq/ room per night	UK DEFRA Conversion factors 2021_Full_set_advanced_ users- Hotel stay

Aviation Impact Factor (AIF)

The Carbon Neutral from 2014 deploys an Aviation Impact Factor (AIF) as a multiplier applied to the GHG emissions from aviation in order to take account of the wider impacts of aviation on climate. The AIF factor for this reference period is 1. AIF is 1.0 until 2020 and is about to rise incrementally by 0.2 per year from 2021 to 2.0 in 2025 and 3.0 in 2030. In accordance with this requirement, the emission factor for business air travels that was selected from the database DEFRA UK 2019 is including the influence of non-CO_2 climate change effects on aviation such as water vapor, contrails, NOx, etc (With RF).

4. GHG emissions

Tables 4.1, 4.2, 4.3 and 4.4 present GHG emissions arising from each category and source, from the facilities of White Desert. Table 4.5 presents index of GHG emissions and figures 4.1 and 4.2, the percentage of contribution of GHG emissions per category and scope.

Table 4.1 Total GHG emissions from office in Cape Town

Emission sources	Cape Town Office				
	GHG emissions				
	t CO_2	t CH_4	t N_2O	t HFCs	t CO_2e
GWP	**1**	**28**	**265**		
Direct GHG emissions					
Category 1: Direct emissions (Non-biogenic)					
1.1 Direct emissions from stationary combustion	0.00	0.00	0.00		0.00
1.2 Direct emissions from mobile combustion	0.00	0.00	0.00		0.00
1.3 Direct emissions arise from industrial processes	Not applicable				
1.4 Direct fugitive emissions arise from the release of GHGs in anthorpogenic systems	0.00	0.00	0.00	0.00	0.00
1.5 Direct emissions and removals from land use, land use change and forestry	Not applicable				
Total direct GHG Emissions	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total direct Equivalent CO_2 Emissions (tCO_2e)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Indirect GHG emissions					
Category 2: Indirect GHG emissions from imported energy (Non-biogenic)					
2.1 Indirect emissions from imported electricity	10.57	0.0004	0.00006		10.60
2.2 Indirect emissions from imported energy	0.00	0.00	0.00		0.00
Category 3: Indirect GHG emissions from transportation (Non-biogenic)					
3.1 Emissions from upstream transport and distribution for goods	Not significant				
3.2 Emissions from downstream transport and distribution for goods	Not significant				
3.3 Emissions from employee commuting	0.00	0.00	0.00		0.00
3.4 Emissions from client and visitor transport	0.00	0.00	0.00		0.00
3.5 Emissions from business travel (transport)	9.92	0.00003	0.0002		9.96
3.5 Emissions from business travel (hotel stay)					0.90
Category 4: Indirect GHG emissions from products used by organization (Non-biogenic)					
4.1 Emissions from purchased goods (paper)	Not significant				
4.2 Emissions from capital goods	Not applicable				
4.3 Emissions from the disposal of solid waste (recycled & household)					0.37
4.4 Emissions from the use of assets	Not applicable				

4.5 Emissions from the use of services that are not described in the above subcategories	Not significant				
Total indirect GHG Emissions	**20.49**	**0.0004**	**0.0002**	**0.00**	**21.83**
Total indirect Equivalent CO_2 Emissions (tCO_2e)	**20.49**	**0.012**	**0.06**	**0.00**	**21.83**
Total GHG emissions (t)	**20.49**	**0.0004**	**0.0002**	**0.00**	**21.83**
Total equivalent GHG emissions (tCO_2e)	**20.49**	**0.012**	**0.06**	**0.00**	**21.83**

Table 4.2 Total GHG emissions from Antarctica facilities

Emission sources	Antarctica				
	GHG emissions				
	t CO_2	t CH_4	t N_2O	t HFCs	t CO_2e
GWP	**1**	**28**	**265**		
Direct GHG emissions					
Category 1: Direct emissions (Non-biogenic)					
1.1 Direct emissions from stationary combustion	68.19	0.002	0.002		68.76
1.2 Direct emissions from mobile combustion	5,384.85	0.14	0.17		5,433.87
1.3 Direct emissions arise from industrial processes	Not applicable				
1.4 Direct fugitive emissions arise from the release of GHGs in anthorpogenic systems	0.00	0.00	0.00	0.00	0.00
1.5 Direct emissions and removals from land use, land use change and forestry	Not applicable				
Total direct GHG Emissions	**5,453.04**	**0.14**	**0.17**	**0.00**	**5,502.63**
Total direct Equivalent CO_2 Emissions (tCO_2e)	**5,453.04**	**3.86**	**45.73**	**0.00**	**5,502.63**
Indirect GHG emissions					
Category 2: Indirect GHG emissions from imported energy (Non-biogenic)					
2.1 Indirect emissions from imported electricity	Not applicable				
2.2 Indirect emissions from imported energy	Not applicable				
Category 3: Indirect GHG emissions from transportation (Non-biogenic)					
3.1 Emissions from upstream transport and distribution for goods	Not significant				
3.2 Emissions from downstream transport and distribution for goods	Not significant				
3.3 Emissions from employee commuting	0.00	0.00	0.00		0.00
3.4 Emissions from client and visitor transport	0.00	0.00	0.00		0.00
3.5 Emissions from business travel (transport)	0.00	0.00	0.00		0.00
3.5 Emissions from business travel (hotel stay)					0.00
Category 4: Indirect GHG emissions from products used by organization (Non-biogenic)					
4.1 Emissions from purchased goods (paper)	Not applicable				
4.2 Emissions from capital goods	Not applicable				

4.3 Emissions from the disposal of solid waste (recycled & household)					0.12
4.4 Emissions from the use of assets	Not applicable				
4.5 Emissions from the use of services that are not described in the above subcategories	Not significant				
Total indirect GHG Emissions	**0.00**	**0.00**	**0.00**	**0.00**	**0.12**
Total indirect Equivalent CO_2 Emissions (tCO_2e)	**0.00**	**0.00**	**0.00**	**0.00**	**0.12**
Total GHG emissions (t)	**5,453.04**	**0.14**	**0.17**	**0.00**	**5,502.75**
Total equivalent GHG emissions (tCO_2e)	**5,453.04**	**3.86**	**45.73**	**0.00**	**5,502.75**

Table 4.3 Total GHG emissions from all the facilities of White Desert

Emission Sources		All facilities				
		GHG Emissions				
		t CO_2	t CH_4	t N_2O	t HFCs	t CO_2e
GWP		1	28	265		
Category 1	Direct GHG Emissions	5,453.04	0.14	0.17	0.00	
	Direct Equivalent CO_2 Emissions (t CO_2e)	5,453.04	3.86	45.73	0.00	5,502.63
Category 2	Indirect GHG Emissions	10.57	0.0004	0.00006		
	Indirect Equivalent CO_2 Emissions (tCO_2e)	10.57	0.01	0.01		10.60
Category 3	Indirect GHG Emissions	9.92	0.00003	0.0002		
	Indirect Equivalent CO_2 Emissions (tCO_2e)	9.92	0.0007	0.04		10.86
Category 4	Indirect GHG Emissions					
	Indirect Equivalent CO_2 Emissions (tCO_2e)					0.49
Total GHG emissions (t)		**5,473.53**	**0.14**	**0.17**	**0.00**	**5,524.58**
Total equivalent GHG emissions (tCO_2e)		**5,473.53**	**3.87**	**45.79**	**0.00**	**5,524.58**

Table 4.4 Total GHG emissions in CO_2 equivalent (t CO_2 e) by Scope for each facility

	Cape Town	Antarctica	Total
Scope 1	0.00	5,502.63	**5,502.63**
Scope 2	10.6	0.00	**10.60**
Scope 3	11.23	0.12	**11.35**

Table 4.5 Index of total GHG emissions per person

Total GHG emissions (t CO_2 eq)	5,524.58
Number of persons (clients and staff)	378
Index of GHG emissions per person (t CO_2 eq/person)	**14.6**

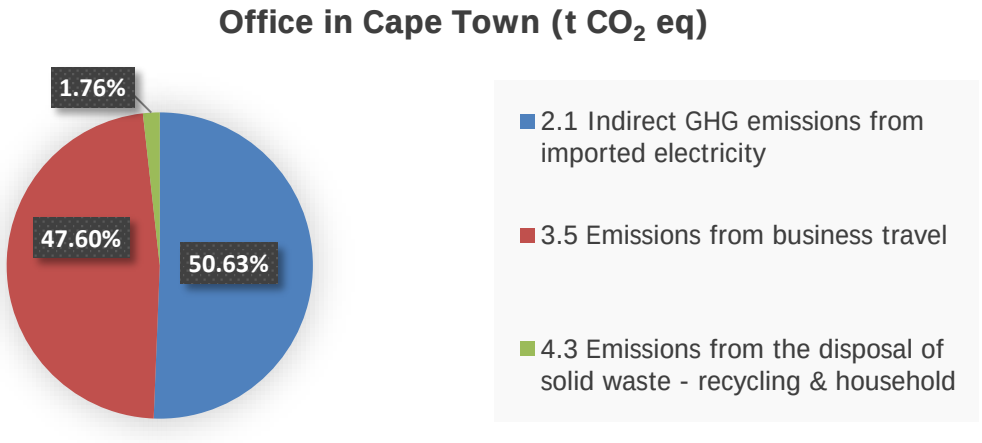

Figure 4.1 Percentage of GHG emissions (t CO_2 e) by each category in Cape Town

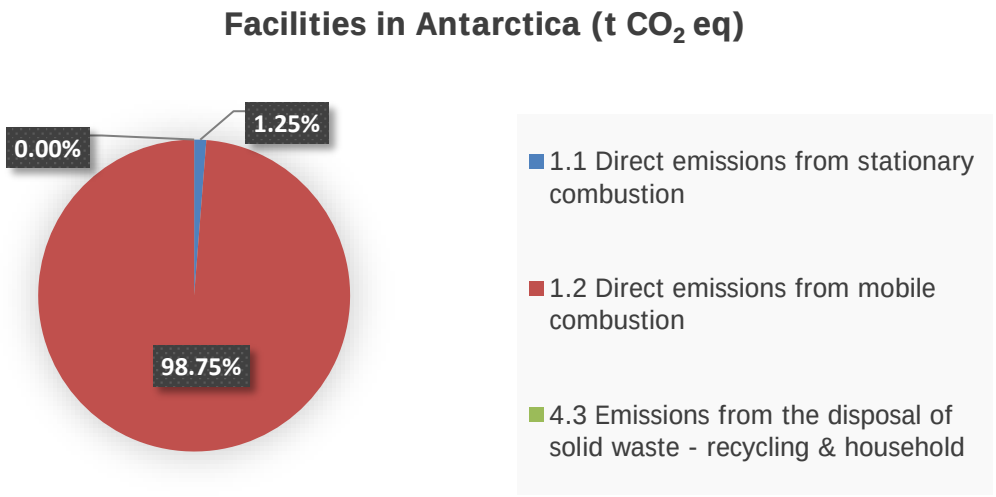

Figure 4.2 Percentage of GHG emissions (t CO_2 e) by each category in Antarctica

5. Mitigation activities – Carbon neutral

White Desert aims to reduce all the GHG emissions arising from activities in Antarctica facilities as well as offices in Cape Town, South Africa, and set near-term Science Based Targets. In order to achieve the targets for the next years, a baseline year has been set (2021 -2022). A report is produced on an annual basis in order to monitor against targets.

The mitigation activities already taken in order to accomplish that are:

- Eliminating waste by using non-single-use plastic and biodegradable products,
- Using solar air heaters to warm the pods in order to minimize dependency on fossil fuel,
- Partnering with an air operator which has signed up to CORSIA scheme (Avcon Jet). CORSIA is the Carbon Off-setting and Reduction Scheme for International Aviation.

The measures proposed for the next years include:

- Replace Jet A-1 fuel use in Antarctica with a more environmentally friendly fuel, SAF (Sustainable Aviation Fuel). SAF is produced from waste oils and fats through an innovative process that reduces lifecycle carbon emissions, creating an 80 percent smaller carbon footprint compared to traditional Jet A-1 fuel. Also, SAF combustion produces fewer particulates and sulfur oxides (SOx), thereby greatly reducing the quantity of soot particles emitted,
- Partner with aviation organisations which monitor their own carbon emissions through international schemes such as CORSIA,
- Consider additional and viable renewable energy options at camps in Antarctica.

White Desert has been off-setting GHG emissions associated with flights since 2007.

White Desert Ltd offset the emissions of the period 2020 - 2023 through the purchase of Certified Emission Reductions (CERs) generated from renewable energy offset schemes.

A Certificate with number: CN20230111067 and Duration: 29 February 2020 – 28 February 2023 was issued by Carbon Neutral in accordance with CarbonNeutral Protocol registry for the voluntary cancellation of carbon offsets of White Desert Ltd that verifies that: “The stated subject is carbon neutral through the use of high quality environmental instruments in accordance with The CarbonNeutral Protocol. All credits adhere to standards approved by the International Carbon Reduction and Offset Alliance (ICROA)”. The tonnes of equivalent CO2 offset were 10,569 (Project info: Global Renewable Energy Portfolio (10,569 t CO2e)).

6. References

1. ISO 14064-1:2018 Greenhouse gases - Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
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5. Caroline Martin, "Generating low-cost national energy benchmarks: A case study in commercial buildings in Cape Town, South Africa", Energy and Buildings 64 (2013) 26–31, Energy Research Centre, University of Cape Town, South Africa.
6. The Carbon Neutral Protocol, the global standard for carbon neutral programmes, Natural Capital Partners (January 2022).
7. Climate transparency report for South Africa, Climate Transparency Organization, 2020, www.climate-transparency.org.